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fact, above stated, that the surface, and consequently the number of pores, is increased when the growing hymenophore comes in contact with foreign substances which are not and cannot be digested by the fungus.

It is not intended above to maintain that *Polyporus applanatus* does not digest and get nutriment from the small dead flies, but that the methods of growth of this and allied species are such that the reasons enumerated in Professor MacMillan's article do not seem sufficient to warrant the inference of a carnivorous habit.

There is, however, a fact suggesting that the hyphæ of the fruiting body of *Polyporus* are sufficiently different from those of the vegetative portion not to be concerned with nutrition or digestion. When two logs lie within a few inches of each other and a sporophore of *Polyporus applanatus* grows out of one log and across to the other, it may spread itself out somewhat upon the latter, but its hyphæ do not seem to penetrate, even in cases where the logs are of the same species and in the same stage of decay. Again, a rotten leaf plastered against the growing hymenophore seems to be a serious obstacle to growth. Instead of sending in hyphæ and digesting the leaf, the latter is covered from the edges as any perfectly indigestible substance would be, or if the leaf be too large the growth of the portion covered is abandoned. And yet, *a priori* reasoning would lead us to suppose that a rotten leaf would be more readily dealt with than a fly, being more nearly like the usual food of the fungus.

Indeed, the very fact that the species of parasitic and saprophytic fungi show such decided preference for certain hosts is an important reason for doubting that *Polyporus applanatus* makes active use of animal nourishment.—O. F. COOK, *Huntington, N. Y.*

NOTES AND NEWS.

GARDEN AND FOREST says that the tallest trees in the world are in the gullies of Victoria, one of which is 471 feet high.

BELOIT COLLEGE has recently dedicated a new building known as Pearsons' Hall of Science, in which admirably arranged botanical laboratories find a conspicuous place.

DR. WILLIAM TRIMEN, director of the Royal Botanical Gardens of Ceylon, is preparing a "Handbook to the Flora of Ceylon," which will be issued soon by Dulau & Co., London.

JARS CONTAINING the tubercle-bearing roots of about forty species of North Dakota Leguminosæ will be shown at the World's Fair by Prof. H. L. Bolley, of the State University at Fargo.

THE BOTANICAL SEMINAR of the University of Nebraska has organized an exchange club for the purpose of facilitating exchanges among collectors in Nebraska and rendering them more satisfactory.

THE MONUMENTAL WORK by Engler and Prantl, entitled "Die Natürlichen Pflanzenfamilien" will be specially displayed at the World's Fair in Chicago, by the publisher, W. Engelmann of Leipzig.

THE COLORED PLATE of *Opuntia prolifera* in the January number of *Meehan's Monthly* is one of the handsomest that has yet appeared in that journal, and is accompanied by an unusually interesting description of the plant.

A BACTERIAL DISEASE of beans is figured and briefly described by Prof. B. D. Halsted in *Garden and Forest* for December (v. 620). It forms blotches upon the pods, and also attacks the leaves. Seed beans may be sufficiently affected to prevent their germination.

PUCCINIA AGROPYRI, a common American species of rust, has now been found in southern Europe by Dr. P. Dietel (*Hedwigia*, 1892), who has also found by culture experiments that it is genetically connected with *Æcidium Clematidis*, also common in America as well as in Europe.

BRADLEY M. DAVIS has filled up the gap in our knowledge of the life history of *Champia parvula* by tracing the development from the spore to a stage identical with the mature condition. Previous investigations by Debray and Bigelow have elucidated the structure of the adult frond.

DR. J. H. SANDBERG, of Minneapolis, invites the co-operation of botanists in the establishment of a botanical exchange bureau. The Botanical Division of the Department of Agriculture has decided, after consulting the members, to turn over to him the work of the Botanical Exchange Club.

M. HENRI HUA has begun in *Journal de Botanique* (Nov. 1) an enumeration of the Chinese species of *Polygonatum*, which represent half the known species. Recent explorations by M. l'abbé Delavay and MM. Farges, Soulié and Pratt, have brought to light 16 new species, making the enumeration for China reach 22.

J. CHRISTIAN BAY, a young Danish botanist now in the employ of the Missouri Botanical Garden, has been asked by the editors to review current literature of vegetable physiology for the *Botanisches Centralblatt*. The authors of papers dealing with vegetable physiology are requested to send copies to the library of the Garden, at St. Louis.

AT A RECENT MEETING (Nov. 3rd) of the Linnean Society, Mr. C. T. Druery exhibited some new examples of apospory in ferns, namely, a specimen of *Athyrium filix-femina*, var. *clarissima*, with pinnæ showing development of prothallia by soral apospory, and a seedling, *Lastræa pseudo-mas cristata*, showing prothallia developed aposporously over the general surface of the frond (pan-apospory).—*Gard. Chron.*

A NEW BOTANICAL JOURNAL was announced to appear in January under the title "Bulletin de l'Herbier Boissier," and will be published at Chambésy, near Geneva, under the direction of M. Eugène Autran, curator of the Boissier Herbarium. It will contain original papers, notes, etc., upon general systematic botany, and is promised to form yearly a stout octavo volume with plates. The price is 12 francs a year.

THE COMPILATION of the systematic and alphabetic index of new species of North American phanerogams and pteridophytes published in 1892, is now in preparation at the U. S. National Herbarium.

The index will be more nearly complete and published at an earlier date, if all botanists will promptly send to Dr. Vasey, Chief of the Botanical Division, their recent monographs and reprints of articles in botanical works.

IN A STUDY of regermination of seed Mr. A. M. Ten Eyck has found (*Agric. Science* vi, 454) that wheat will germinate fourteen times, after an interval each time of seven days drying at ordinary temperature. Corn gave six such germinations, radish five, parsnip and carrot two, and celery, clover and pansy one. It was also found that the seeds of any lot which germinated quickest were strongest and could withstand more drying. See also this journal, xvii, 230.

M. JULES CARDOT has begun in the fifth and sixth numbers (double) of the *Revue Bryologique* for 1892 a list of all the species of mosses now known from North America, showing their geographical distribution. The list is not critical, including all the species of Lesquereux & James' Manual and all new species described since its publication, except in the case of evident duplication. Enumerated in this way (useful at present, but obviously an overestimate) our bryologic flora contains about 1350 species.

THE BOTANICAL PAPERS read at the meeting of the Iowa Academy of Sciences, Dec. 27th and 28th, were: On the absence of ferns between Ft. Collins and Meeker, Col., by *F. M. Witter*; Phenological notes for 1892, Relation of frost to certain plants, Notes on the flora of Texas, and Pollination of cucurbits, by *L. H. Pammel*; Palisade cells and stomata of leaves, and A key for the identification of weed seeds in clover, by *F. C. Stewart*; and Notes on the flora of Muscatine, by *Fred. Reppert*. The Academy will hereafter have its proceedings published by the State.

A DESCRIPTION of last season's botanical work in Idaho, done by J. H. Sandberg, A. A. Heller and D. T. MacDougal, the party sent out under the auspices of the Botanical Division of the U. S. Department of Agriculture, appears in *Science* for Dec. 2, 1892, written by Mr. MacDougal. The north-central portions of Idaho were traversed, a region almost wholly unknown botanically heretofore. About 25,000 herbarium specimens, mostly phanerogams, embracing nearly a thousand species, were obtained, together with much valuable biological and geographical information pertaining to the vegetation of the region.

A NOTEWORTHY AND COMMENDABLE undertaking is that of a botanical survey of Nebraska, to be conducted by the Botanical Seminar of the State University. It is a private enterprise, to be paid for by the members of the Seminar, whose devotion in this respect cannot be too highly commended. Being private, the work can be purely scientific, and so of vastly greater interest to the botanical public. We look for results commensurate with the energy shown in the organization. A preliminary circular announcing the organization and its purpose has been issued, and from its tone it may be inferred that the work is not only to be prosecuted vigorously, but that the form of its publication will be as modern as the knowledge of the Seminar can make it. Mr. Albert F. Woods is the secretary.

THE LEAVES AND FLOWERS OF MILFOIL, or yarrow (*Achillea Millefolium*), inebriate, and were used by the Dalecarlians in Sweden to render their beer intoxicating. Clary (*Salvia Sclarea*) and saffron have also been used for this purpose. The last exhilarates the spirits to such a degree that, when taken in large doses, it occasions immoderate mirth and laughter. Darnel (*Lolium temulentum*), which is vulgarly known in England under the name of sturdy, when malted with barley, causes the ale brewed from it to be speedily intoxicating. Among the many different inebriants, the inspissated milky juice of the common garden lettuce is considered as powerful in its operation as opium itself.—LOUIS PRO in *Am. Brewer's Rev.* vi. 315.

BOTANICAL WORK is being prosecuted to a greater or less extent at thirty-two stations in the United States, as shown by statistics gathered by Prof. Atkinson and recently published in *Science*. The study of fungus and bacterial diseases and of their treatment is the subject receiving most consideration. Some give attention to systematic botany in the study of the native flora, a few are investigating the life history of certain fungi, and a few carry on physiological work. At some stations the botanist's duties do not materially differ from those usually performed by a horticulturist. On the whole the results of botanical efforts at the stations are commendable. They are certainly not behind the results displayed by the other departments of the stations.

MR. A. LASCHÉ CALLS ATTENTION (*Am. Brewer's Rev.* iv. 305) to the doubtful value of the results obtained by Dr. H. Moeller (*Centr. f. Bak. u. Par.* xii. 537) in the study of the spores of yeast. Dr. Moeller arrived at the conclusion that yeast has no true spores, that the so-called spores are without cell-wall or nucleus, and are incapable of germination. Mr. Lasché points out that the method used by the investigator would rarely result in spore formation, and that his photographs alone demonstrate that he obtained no true spores for study. Mr. Lasché's exceptions are certainly well taken, and it is strange how a lengthy, illustrated paper (14 pp., 1 pl.) with such sweeping generalizations, based upon such faulty observation, could find place in a high class journal.

A LABORATORY for the study of plant diseases has recently been fitted up in connection with the agricultural experiment station of the University of California, at Berkeley. A description of it with plans is given by Mr. C. W. Woodworth in a recent number of *Science* (xx 368), from which we learn that it consists of a room about twenty by thirty feet from which a corner is partitioned off for a private laboratory. There is also a small photographic dark room. The fittings consist of suitable tables, desks, shelves, etc., together with microscopes, microtomes and imbedding apparatus. Provision is made for cabinets of slides, herbarium specimens and pathological samples. The subject is approached from the entomological side, which probably accounts for the fact that while an improved insect box is described nothing is said of apparatus for the cultivation of fungi and bacteria.

PROFESSOR CARRUTHERS' report of the Department of Botany of the British Museum for 1891, appears in the *Journal of Botany* for December (1892). During the year 41,875 specimens have been placed in the herbarium, most of them being collections of oriental plants. It is

reported that the DeBary slides have been arranged in systematic order. "The medium originally employed in mounting the preparations having been insufficiently secured, every slide has been carefully examined, resealed, and, wherever necessary, the specimen has been remounted." The William Smith typical collection of British *Diatomaceæ*, illustrating his standard work, has been added to by the mounting of much unmounted material. Triana's study set of New Grenada plants, which has formed the basis of his publications, is one of the notable additions of the year, as is also the Ravenel collection of N. Am. cryptogams, consisting of more than 14,550 specimens, and including all the species which were described from his material by Berkeley and others.

THE FIRST FASCICLE of "Grasses and Grass-like Plants" issued by A. B. Seymour, of Harvard University, is the beginning of what promises to be a valuable aid to workers among such plants. The fascicle issued contains rushes and sedges, as well as true grasses, and illustrates a wide range of genera as well as of localities, and of the more variable species two or more specimens are given showing extreme as well as typical forms. Each specimen has been compared with others of the same species in the Gray herbarium, or has been determined by some recognized authority whose name appears on the accompanying label. The labels also give references to various government and station publications regarding the economic importance of the species. The specimens are of standard size, and usually well preserved.

The want of authentic specimens for comparison has been deeply felt by all agrostologists, especially by those who are connected with the experiment stations, and we are glad to know that Mr. Seymour intends to continue his distributions until all the more important species have been illustrated.—S. M. T.

THE BOTANICAL PAPERS presented at the eighth annual meeting (Dec. 28th and 29th) of the Indiana Academy of Science are as follows: Notes on the reproduction and development of *Grinnellia Americana* Harv., *M. A. Brannon*; Some effects of mutilation on forms of leaf and sex of *Morus alba* and *M. nigra*, *A. N. Somers*; Botanical field work in W. Idaho, and How a tendril coils, *D. T. McDougal*; The application of mathematics in botany, and An auxanometer for the registration of growth of stems in thickness, *Katharine E. Golden*; On the fertilization and development of the embryo in *Senecio aureus*, and The apical growth of the thallus of *Fucus vesiculosus*, *D. M. Mottier*; Distribution of the N. Am. Cactaceæ, *John M. Coulter*; *Marchantia polymorpha* not a typical or representative liverwort, A state biological survey, and The need of a large library of references in cryptogamic botany in Indiana, *L. M. Underwood*; Forestry exhibit of Indiana at the Columbian exposition, Notes on the flora of the Chilhowee and Great Smoky Mts., and Additional facts regarding forest distribution in Indiana, *Stanley Coulter*; Notes concerning certain plants of the S. W. counties of Ind., and The "Lilly Herbarium" and its work, *John S. Wright*; Spines and epidermis of cactaceæ, *E. B. Uline*; Preliminary notes on the genus *Cactus*, *E. M. Fisher*; Some causes acting physiologically toward the destruction of trees in cities, and Botanical assemblies in the U. S. announced for 1893, *J. C. Ar-*

thur; Symbiosis in Orchidaceæ, and The genus *Corallorhiza*, *M. B. Thomas*; Development of ovule in *Aster* and *Solidago*, *G. W. Martin*; Notes on root tubercles of indigenous and exotic legumes in virgin soil of the northwest, *H. L. Bolley*.

IN THE *Kew Bulletin* for December there is a very interesting paper upon the disappearance of desert plants in Egypt. It relates to the causes of the disappearance of the arboreal desert vegetation of Egypt within historic times, being an extract from the report of the expedition despatched by the Khedive in 1891 to the country between the Nile and the Red Sea. Conclusive evidence is first advanced of the former abundance of an arboreal desert vegetation in comparatively recent times, and the cause of its disappearance is summed up as follows: "To sum up all the facts which I have urged in the preceding pages, it seems clear that in the camel, nature has created a Frankenstein which in this country is gradually devouring her. And it seems that what is applicable to this country is applicable to all countries where soil and climate are fit to produce wild shrubs but not fit to support cultivation. It seems that nature is being slowly but surely beaten by the camel and his inevitable but improvident companion, the axe. Nature fights hard. This year copious rains have fallen in the mountains, but the reply of the Arab is to send for grazing a correspondingly larger number of camels." The same case is called on to explain the disappearance of frankincense and spices from S. Arabia, and of the former abundant vegetation of Palestine which could support a population and herds out of all proportion to its present circumstances. In fact the Arabs in Palestine say that there were formerly lions there, but they were frightened away by the camel. "It is probable that the camel has expelled the lion from Palestine, not by roaring, but by consuming the shrubs which supported the lion's prey."

FROM advance sheets of the fourth annual report of the Director of the Missouri Botanical Garden we gather the following:

The number of visitors to the grounds through the past year has been considerably increased as compared with preceding years.

A marked improvement has been made this year in opening up the eastern side of the garden proper, which has been densely shaded heretofore by overgrown shrubbery. This has permitted the conversion of a large tract of bare ground into lawn. The decorative plants, which have been increased considerably in number notwithstanding this seeming extension of the lawn area, have been grouped in clusters instead of being arranged as heretofore in long monotonous rows of a single species, and the number of species in cultivation has been greatly increased by gifts and purchases, and the Director was able to secure from the dry district of Texas, Arizona and California a number of representatives of the more characteristic yuccas, agaves and cacti.

The chief additions to the herbarium have consisted of the current American collections, about 3,000 duplicates from the herbarium of the late John Ball, and a set of some 1,200 New Zealand plants, purchased; and a set of the valuable *Exsiccata* of the Austrian flora, donated by the Vienna Museum. The herbarium, as now arranged, is composed of about 16,000 specimens of thallophytes and 187,000 of other plants.

It has not been found practicable to add to the library as freely as could have been wished, but during the year about \$1,427 was spent for purchases and binding. A much needed card index to the species of plants described and figured in works at the Garden has been begun.

An enumeration of the present contents of the library shows 5,225 books, appraised at \$19,300, 6,280 pamphlets, appraised at \$1,850; giving a total valuation of \$21,150.

Dr. Sturtevant has donated his entire botanical library, including the scrap books of his own writings and his manuscript notes on edible plants, with the privilege of retaining the books during his life, or so long as he may have occasion to use them. The library presented in this manner by Dr. Sturtevant is undoubtedly the most complete and valuable American collection of pre-Linnæan botanical books, and represents the expenditure of a great amount of time and money on his part, since he has for many years been interested in bringing together the early literature of the science, especially in its application to economic plants. In accepting this generous and quite unsolicited gift, the Board of Trustees of the Garden at their November meeting expressed their appreciation of its value and of the spirit in which it was tendered, and voted that on its actual receipt at the Garden it should be arranged, together with other works published prior to the time of Linnæus, in a separate alcove, the whole to be known as the E. Lewis Sturtevant library of pre-Linnæan botany. Whenever this alcove shall be opened, a catalog e of its contents will be published, in order that students of botany may know where a collection of books of this character can be consulted.

In the early part of the year, Dr. Sturtevant also donated to the Garden his extensive and valuable collection of specimens, manuscript and illustrations, largely in color, of the genus *Capsicum*, on condition that the genus should be studied with reference to an ultimate monograph of the wild and cultivated forms. On accepting this generous gift, seeds were procured of all obtainable varieties, and about 125 named sorts have been cultivated by Mr. Duffey, and made the subject of study through the season by Mr. Dewart; and it is proposed to continue the work through 1893 and as much longer as may be necessary.

In order to obtain facilities not in its possession for the study of marine botany, and with a view to promoting such study, the Board this year authorized the Director to subscribe for the present \$100 annually, for a botanical research room in the Marine Biological Laboratory at Wood's Holl, Mass., on condition that it should be actually used each year for botanical work. It is not probable that a member of the Garden staff can regularly make use of the facilities secured in this way, and when this cannot be done the Director is desirous of having the room used by some competent botanist not connected with the Garden, and invites correspondence early in each year from professors or others who may wish to study our marine flora. The only conditions imposed in such allotment of the room are that it shall be used exclusively for botanical work, and that in the publication of any results obtained the Garden shall receive credit for the facilities offered; but the Director wishes, if good reason to the contrary does not exist, to have the results of any important research published in the reports of the Garden. During the season of 1892, the room was used by Mr. M. A. Brannon, who was occupied with a study of *Grinnellia Americana*.